

## WHAT IS CLAIMED IS:

1. A method for manufacturing a semiconductor device comprising the steps of:  
sequentially forming a gate insulating film and an initial semiconductor film on an insulating surface having gate lines formed thereon such that they are stacked without being exposed to the atmosphere;

crystallizing said initial semiconductor film by irradiating it with infrared light or ultraviolet light to form a crystalline semiconductor film and an oxide film simultaneously;  
and

covering a region to become a channel formation region of said crystalline semiconductor film with a mask and doping a region to become a source region or drain region of said crystalline semiconductor film with a trivalent or pentavalent impurity element through said oxide film.

2. A method according to claim 1 further comprising the step of retaining a catalytic element for promoting the crystallization of silicon in contact with the surface of said initial semiconductor film or within said film after said step of forming the gate insulating film and the initial semiconductor film.

3. A method according to claim 1 wherein contaminants on the surface on which said initial semiconductor film is to be formed are reduced using active hydrogen or a hydride.

4. A method according to claim 1 further comprising the step of forming a multi-layer film including a silicon nitride film as any of the layers as said gate insulating film.

5. A method according to claim 1 further comprising the step of forming a multi-layer film including benzocyclobutene as a part of said gate insulating film.

6. A method for manufacturing a semiconductor device comprising the steps of:  
sequentially forming a gate insulating film, an initial semiconductor film and an insulating film on an insulating surface having gate lines formed thereon such that they are stacked without being exposed to the atmosphere;

crystallizing said initial semiconductor film by irradiating it with infrared light or ultraviolet light through said insulating film to form a crystalline semiconductor film; and covering a region to become a channel formation region of said crystalline semiconductor film with a mask and doping a region to become a source region or drain region of said crystalline semiconductor film with a trivalent or pentavalent impurity element through said oxide film.

7. A method for manufacturing a semiconductor device according to claim 6 wherein said gate insulating film, said initial semiconductor film and said protective film are formed using different chambers.

8. A method for manufacturing a semiconductor device according to claim 6 wherein said gate insulating film, said initial semiconductor film and said protective film are formed using the same chamber.

9. A method for manufacturing a semiconductor device according to claim 6 wherein said gate insulating film and said protective film are formed using a first chamber and wherein said initial semiconductor film is formed using a second chamber.

10. A method according to claim 6 further comprising the step of retaining a catalytic element for promoting the crystallization of silicon in contact with the surface of said initial semiconductor film or within said film after said step of forming the gate insulating film and the initial semiconductor film.

11. A method according to claim 6 wherein contaminants on the surface on which said initial semiconductor film is to be formed are reduced using active hydrogen or a hydride.

12. A method according to claim 6 further comprising the step of forming a multi-layer film including a silicon nitride film as any of the layers as said gate insulating film.

13. A method according to claim 6 further comprising the step of forming a multi-layer film including benzocyclobutene as a part of said gate insulating film.